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TIMBER SUPPLIES, GROWTH, & DEPLETION IN THE THREE LAKE STATES

PRELIMINARY STATISTICS AND ANALYSIS OF DATA OBTAINED FROM FOREST SURVEYS AND OTHER ECONOMIC STUDIES BY THE

LAKE STATES FOREST EXPERIMENT STATION
UNIVERSITY FARM - ST. PAUL, MINNESOTA

U. S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE

Economic Notes No. 11 August 1939

TIMBER SUPPLIES, GROWTH, AND DEPLETION IN THE THREE LAKE STATES

A preliminary summary of data from the Forest Survey.

by

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1/ Maintained by the United States Department of Agriculture at University Farm, St. Paul, Minnesota, in cooperation with the University of Minnesota.

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FOREWORD

Since completing the field inventory of timber resources in 1937, the Lake States Forest Experiment Station has received many requests for statistics, and many comments upon forest conditions in the region. As rapidly as possible, the Station has been releasing detailed figures in the form of multilithed Economic Notes. Ten such Notes have now been prepared. These give fairly complete estimates of forest areas and timber volumes in the three states.

For those who are interested in a broad picture of conditions in the Lake States and the conclusions which can be drawn from it, rather than the intimate details, it now seems advisable to issue a brief summary statement of inventory estimates. Certain data on growth, depletion, and ownership are added to give greater significance to the timber estimates.[2/]

2/ Assistance in the preparation of these materials was furnished by the personnel of the Works Progress Administration, Official Project No. 165-71-6999 - 3-400.

It is, of course, impossible to make an adequate analysis of conditions on such a broad scale. The intention is to prepare more detailed and complete reports on each state and for the region as a whole. Meanwhile, this preliminary statement may serve to call attention to some of the major problems of the region and suggest lines of activity to correct the more serious faults.

Raphael Zon
Director

TIMBER SUPPLIES, GROWTH, AND DEPLETION IN THE THREE LAKE STATES

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The General Situation

Timberland Area.

The forest area of the Lake States as shown in tables 1 and 2 is almost identical with the productive forest area of Sweden and also with that of Finland. However, Finland has 15.8 acres per capita; Sweden 9.4 acres; while there are but 5.4 acres in the Lake States.

The acreage of old-growth saw timber as shown in table 3 is very small; only 3-1/2 million acres remain in the region. Fifty-six percent of this total is in Michigan, mainly in the Upper Peninsula. The same table shows almost 21 million acres of deforested or poorly stocked cut-over lands in the three states.

The poorer forest types predominate at the present time in the Lake States. Table 4 shows 18.4 million acres of aspen as against 8.2 million acres of northern hardwood and 3.7 million acres of pine. This predominance is most noticeable on the cordwood and restocking areas. More detailed estimates by forest-survey units are given in Economic Notes No. 10.

Timber Volumes.

The total volume of wood shown in table 7 and table 13 averages about 464 cubic feet per acre. If the lands were well stocked and had a proper distribution of age-classes the average volume should be at least twice this amount. The forests of Sweden average about 874 cubic feet per acre.

The volume of saw timber given in tables 8 and 9 is 60 percent greater than earlier estimates. However, as shown in the footnote to table 8, about one-fifth of the volume is not in commercial stands. It is thinly scattered over the logged-off lands. The volumes are expressed in terms of lumber tally and

include all trees down to 9-inch diameter. Commercial stands[1] of the more valuable species do not exceed 37 billion board feet.

Tables 10 and 11 show a large volume of cordwood in the region with over 128 million cords of those species commonly used for pulp. But much of this volume is not available because of poor quality, inaccessibility, and scattered occurrence. The supply of spruce -- the key species in Lake States paper production -- is very limited.

Table 12 shows an almost incredibly large number of cedar poles in the Lake States. It will be noted that most of those are 25 feet or less in length.

Current Growth.

Annual growth, shown in table 16 to be 1,850 million board feet of saw timber, plus 9,399,000 cords of smaller wood, is considerably greater than earlier estimates indicated. However, these lump figures can be very misleading. It must be understood that the bulk of the growth occurs on the cordwood and restocking lands and is not available for immediate cutting. New growth is on small trees in sparse stands, and largely in species of relatively low commercial value. Twenty-one percent of the saw-timber growth and 42 percent of the cubic-foot growth is of aspen.

Depletion.

Table 19 gives current depletion. The following points are worth noting:

1. The total depletion in cubic feet (981 million) is almost identical with current growth (978 million). This would seem to indicate that the forests were just holding their own.

1/ Areas supporting 2,000 board feet, or more, per acre.

2. Depletion is greater than growth in large timber. Total sawlog depletion is 2,348 million, 27 percent greater than the annual growth of 1,850 million.

3. The excess cut is mainly of softwoods. Depletion of softwood saw timber is 44 percent greater than growth.

4. The total volume of saw timber removed is greater than might be expected from statistics of lumber production (table 18). The cut of small portable sawmills is often overlooked in the census of Lumber Production. The aggregate demands of other industries also account for a greater total depletion. The combined consumption for veneer mills, pulp mills, mine timbers, posts, fuel wood, chemical wood, etc., plus loss from fire, insects and disease, gives a total equally as large as the total of lumber cut.

5. The depletion of cull trees and tops of saw timber is considerable, but is not as great as would be desirable to put the forests in a good growing condition. Furthermore, not more than half the volume cut is profitably utilized. Large volumes are left to rot in the woods.

An important point not clearly stated in the table is that most of the current cutting retards rather than stimulates current growth. Clear-cutting in northern hardwoods, premature cutting of pulpwood stands, and "high grading" of farm woods are common practices.

Growth -vs- Depletion

In table 20 the total inventory, growth, and depletion estimates are given by states and subdivisions, and another column is introduced to shown the allowable annual cut if the forest lands are to be managed for permanent yields. Inasmuch as most of the lands are understocked, the allowable cut will be less than current growth for the next few years.

Except in northern Minnesota, the present drain is considerably greater than the allowable. The extra allowable volume in Minnesota is chiefly in the Superior district where lack of transportation facilities have prevented extensive exploitation of the jack pine and mixed species now available for cutting.

In the northern hardwood region -- northern Wisconsin and the Upper Peninsula of Michigan -- the present drain is 75 percent greater than the calculated allowable drain -- 1,369,400,000 board feet actual against 784,800,000 board feet allowable.

In the farm-woods districts of southern Minnesota, Wisconsin, and Michigan, present drain is about 60 percent greater than the allowable drain -- 505,500,000 board feet actual against 314,400,000 board feet allowable.

Pine Situation

Pine forests (except jack pine which will be considered in connection with the pulpwood problem) are almost gone in the Lake States. Only 784 thousand acres of pine saw timber of any kind remain and two-thirds of this is inferior second growth. The remaining old-growth pine is largely in parks or in patches too scattered to sustain large-scale operations. Practically all of the large pine mills have disappeared and there is no reason to expect their early return.

Nevertheless, large areas in the northern Lake States have natural advantages for the production of pine timber. Soil and climate are suitable and there is a large potential market, both within the region itself and in adjacent prairie states.

There are 2,661,000 acres of deforested pine land and 6,934,000 acres of sandy pine land occupied by aspen, paper birch, and scrub oak. While natural regeneration may be expected eventually, indications are that it will be very slow. Planting seems to be the only recourse if early reforestation is to be accomplished.

Northern Hardwood Situation

The Lake States hardwood region in the Upper Peninsula of Michigan and the northern part of Wisconsin is of national significance. A large and diversified manufacturing industry has grown up, dependent upon maple, birch, and associated timber species as raw material. Some $150,000,000 capital has been invested in sawmills, veneer plants, chemical mills, etc., and timber supplies to keep them running. Many millions additional have been invested in furniture, flooring, and woodenware plants which convert the hardwood lumber into finished products.

Within the region are over 150 villages and small cities up to 15,000 population, whose economic fortunes are interwoven with the fortunes of the hardwood lumber industry. Many farmers engage in logging or work in the mills during the winter months. In the region as a whole, from 60,000 to 70,000 men are given full or part-time employment by the hardwood industries and in the woods.

The Lake States hardwood district embraces, roughly, 23-1/4 million acres or about one-fifth of the total land area of the Lake States. Although 84 percent of the district is covered with some kind of forest, only 9 percent, or 2,013,000 acres, consists of virgin hardwoods. The rest includes second-growth forests, pulpwood stands, or sparsely-wooded brush and grass land.

The total volume of northern hardwoods with hemlock and other associated species is almost 32,500 million board feet. One-third of this total consists of inferior species, scattered trees on cut-over land, or trees below the sizes currently utilized. Approximately 20,400 million board feet are in accessible and commercially loggable stands.

The 20,400 million feet of hardwoods and hemlock in loggable stands are being cut at the rate of about 950 million feet per year. An additional 70 million feet, on the average, are lost through fire, insects, and disease. This total depletion of 1,020 million feet is more than five times the current growth in merchantable stands of only 182 million feet.

Thus, the hardwood industry in the Lake States is on a rather precarious footing. Apparently the bulk of the industry cannot last more than 15 or 20 years under present trends and practices.

But the situation is not hopeless by any means. In addition to the 2 million acres of old-growth hardwood timber, there are 3,152,000 acres of second growth in large bodies, ranging from trees close to sawlog size, to saplings less than 1 inch in diameter. Some of this acreage will become merchantable in the next 40 years and much more in the course of 60 to 80 years.

If the life of the old-growth stands could be prolonged to 40 years rather than cleared off in 15 or 20, the critical period for the industry would be past. The hardwood forests, because they contain trees of all sizes, can be cut selectively at frequent intervals. If, instead of clear-cutting as is now the common practice, the entire lumbering industry could operate on a selective-logging basis, growth in the selectively-cut stands would be practically three times as great as present growth in the virgin forest. There is enough accumulated experience in partial logging in the region to permit immediate adoption of selective logging and the present 2 million acres of old-growth northern hardwoods, if selectively logged, would support an annual cut of about 500 million feet.

There are no serious technical obstacles to managing the northern hardwood forests for sustained yields. In contrast with pine which on many areas must be replanted at great expense, nature takes care of reproduction in the hardwood stands. In most of

the mature hardwood forests there is already a well-established understory of small trees which will develop into merchantable timber when the older trees are removed.

The only important obstacles to managing the forests on a sustained-yield basis are of an economic nature.

Pulpwood Situation

Pulp and paper manufacture is one of the really important industries in the Lake States. Wisconsin ranks third in the United States in production of wood pulp, fifth in production of paper. Michigan ranks second in paper production. Minnesota, with less industrial development, is an important source of pulpwood. The Lake States pulp and paper mills have an estimated value of $139,000,000 and have given employment to about 28,000 people.

The production of paper has increased during the past 20 years in spite of declining supplies of raw material. The wood supply problem has been met in Wisconsin and lower Michigan in several ways: by importing wood from Minnesota and Canada, and more recently, importing pulp from the Pacific Coast, Finland, Norway, Sweden, and Russia; also by increasing the proportion of inferior species and lowering standards of size and quality. With a growing scarcity of spruce, the use of hemlock, jack pine, balsam fir, aspen, and a few other hardwoods has expanded.

The natural effect of these developments is decreased pulp yield and increased cost of production. Some of this effect has been offset by the depression and by technological improvements. Nevertheless Lake States mills are beginning to feel a disadvantage in competition with mills of other regions largely on account of the wood situation.

The pulp and paper industry in the Lake States may be able to survive for a number of years on imported wood by virtue of manufacturing skill, contact

with nearby markets, and certain other advantages, but to perpetuate the industry on a sound and healthy basis will require the development of a local low-cost wood supply.

Part of this supply may be assured through selective cutting on the hardwood forests, part by more economical management of the spruce swamps, part by reforesting denuded lands, and part by still further widening the use of inferior species.

Farm Woods Situation

The southern portion of the Lake States contains 13,153,500 acres of natural or planted forest mostly in farm woods. Only one-sixth of this acreage bears timber of sawlog size and quality. The rest is occupied by second growth ranging from fairly good cordwood stands of oak, elm, and maple, to sparse open groves valued primarily as pasture.

The average acre of woods has about 1,000 board feet of timber and 4 cords of small and rough wood -- 6.3 cords altogether. Actually, the good timber is concentrated on a relatively small proportion of the farms. The majority of farm-woods areas produce nothing but posts, firewood, and a few ties.

There are a number of reasons for the lack of good timber on the farm woodlands. Dairy farming is the leading type of agriculture in the region. Many of the farms are too small or too poorly organized to maintain a dairy herd large enough to support a farm family, without using the wood lot for pasture.

A high proportion of southern Lake States farms are operated by tenants who have no incentive to improve the wood lots. Many of the farmers have had little or no experience in woodland management and do not know how to improve their farm woods. Many patches of old growth could be greatly improved by light partial cutting. The cutting has not been done because owners were afraid of damaging the areas.

The poor prices usually offered for logs and tie timber cannot help but discourage forest management in this region. The farmer who has only a small odd-lot assortment of logs to sell is at the mercy of the buyers. There is need for some cooperative work in pooling, grading, and marketing products from groups of farms.

Unfortunately, the run-down condition of most farm woods in the Lake States region, not only discourages initiation of forest management by individual owners, but it prevents any effective organization of pools or cooperative projects of similar nature. Apparently there is need for some artificial stimulus to farm forestry. Once underway, it should spread of its own momentum. Some sort of subsidy may be justified to encourage improvement of the run-down wood lots, intensive education through demonstrations and literature, and help in planning the farm layout. Possibly special loans, both to enlarge the farms which are too small, and to help tenants acquire an equity in the land they work, would also be helpful. Where intensive programs of education and subsidy in the interest of soil conservation have been carried on, farm wood lots have been holding their own or in a few cases expanding. Elsewhere the tendency is to clear additional areas and allow the woodlands to deteriorate.

The Situation in Industrial Forestry

Three-fifths of the forest land in the Lake States is in private ownership. (See tables 5 and 14.) Over half of this private acreage is in industrial or other large ownership.

In general, the private forests are more accessible and more productive than the public forests. They contain four-fifths of the remaining saw-timber volume.

Of the total lumber cut in 1936, 94 percent was cut from private lands. Public forests contributed only about 100 million board feet or 6 percent.

Most of the recreational and related developments in the Lake States region are in private ownership. Hundreds of miles of timbered lake-shore, unnumerable trout streams, many natural deeryards, and other features of general public interest are in private ownership.

An analysis made by the Regional Office of the U. S. Forest Service in Milwaukee, indicated that not more than 5 or 6 percent of the 16,478,000 acres of industrial forest is being managed for sustained yields. About 90,000 acres are under intensive management with carefully prepared plans and provision for sustained yields. Another 812,000 acres are less intensively managed but are operated under plans to keep them permanently productive. Included in these tracts are 57,000 acres of selectively-logged hardwoods and 50,000 acres of replanted land.

Most of the remaining areas are receiving reasonably good fire protection, but show little progress toward solving the problems which have been listed. At present 6,186,000 acres of industrial forest area are deforested or inadequately stocked with natural reproduction. Many of these lands are tax delinquent.

In the northern hardwood district most operations are set up on a liquidation basis. Many operators are expecting to exhaust their timber resources within the next few years and most holdings will be cut out within 15 to 20 years. Most of the nonoperators are selling stumpage and some are expected to install their own mills. Very few land owners have enough consolidated timber holdings to operate on a sustained-yield basis.

Although a number of pulp companies own timber reserves in the Lake States, most of these are small areas held for emergencies, rather than as a permanent source of wood. Only two pulp companies in Minnesota and three or four in Wisconsin can be rated as really large timberland owners.

The chief obstacles to permanent industrial forest management are (1) excessive manufacturing capacity, (2) poor mill location with respect to

timber supplies, (3) an unfavorable tax situation, (4) problems of obtaining credit, (5) competition from low-wage regions, (6) increasing costs. These, together with the natural hesitancy of individuals to go into long-term operations, practically preclude solution of the problem by individual initiative.

Public Ownership Situation

The federal government owns about 6,818,000 acres of commercial forest land in the region, while the states, counties, and muncipalities own 4,039,000 acres. An additional acreage estimated at close to 10,000,000 has been tax delinquent for many years and is in process of reversion to the states (counties in Wisconsin).

The public forests contain relatively little mature timber. Most of the lands now included have been recently cut-over or burned. This is one handicap in sustaining forest industries.

In addition, the public forests are not organized for most efficient management. Although the eight national-forest areas contain 12,196,000 acres, only 5,756,000 acres, or 47 percent are actually government owned. The intermingled lands under private ownership may be clear-cut or otherwise abused without hinderance. This heterogeneous ownership, also prevalent in state and county areas, results in more costly protection and administration, and prevents the operation of sustained-yield management plans for natural logging units.

Conclusion

The scope of this report is not to solve, but to call attention to the problems of forestry in the Lake States, and summarize the facts. Apparently the problems which deserve the most immediate and concentrated attention are these:

1. The blocking and stabilization of ownership, either by facilitating private ownership, or arranging for public acquisition.

2. The efficient utilization of remaining old-growth forests.

3. The reduction of fires and premature cutting in second-growth forests.

4. The utilization of inferior woods now going to waste.

5. A reforesting of denuded lands and conversion of aspen and scrub oak to better types.

6. Helping farmers to market their woods products, and generally improving the farm-woods situation.

Table 1. -- Land area of the Lake States region, by major classes of land use and states

(Thousand acres)

State	Total	All forest land	Cropland in farms	Pasture and range			Other
				Total	In farms	Not in farms	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Minnesota.....	51,026	19,615	20,517	4,768	4,768	.....	6,126
Wisconsin.....	35,127	16,946	10,662	4,866	4,866	.....	2,653
Michigan.....	36,400	19,073	9,580	3,703	3,703	.....	4,044
All states.....	122,553	55,634	40,759	13,337	13,337	.....	12,823

Total areas shown in column 1 have been compiled from records of the U.S. General Land Office. They do not check exactly with figures used in the Census of Agriculture but are thought to be more accurate.

Forest areas in column 2 are from the Forest Survey.

Acreage of cropland and pasture are from the 1935 Census of Agriculture. Acreages of other land in the last column are a residual.

Table 2. -- Forest land areas of the Lake States region, by broad classes and states

(Thousand acres)

State	Total forest land	Commercial forest land	Non-commercial forest land		
			Total	Withdrawn from timber use	Chiefly valuable for purposes other than timber
Minnesota....	19,615	17,244	2,371	.....	2,371
Wisconsin....	16,946	16,472	474	.....	474
Michigan.....	19,073	18,679	394	.....	394
All states...	55,634	52,395	3,239	.....	3,239

The non-commercial forest in this table consists of non-productive spruce and tamarack swamps and the completely deforested swamps which cannot be expected to produce timber for 100 years or more.

No deductions have been made for roadside strips, resort areas, state parks, etc. Approximately 3 percent of the commercial forest area is included in such areas, but the timber is not wholly reserved from use.

Table 3. -- Commercial forest land areas of Lake States region, by character of growth and state

(Thousand acres)

State	Total	Saw-timber areas 1/			Cord-wood areas 2/	Fair to satisfactory restocking areas 3/	Poor to non-restocking areas 4/
		Total	Old growth	Second growth			
Minnesota	17,244	1,566	343	1,223	4,553	4,777	6,348
Wisconsin	16,472	2,406	1,245	1,161	2,874	4,498	6,694
Michigan	18,679	3,151	1,998	1,153	3,404	4,167	7,957
All states.	52,395	7,123	3,586	3,537	10,831	13,442	20,999

1/ Saw-timber stands contain 2,000 board feet or more per acre, the regional average being 9,000 board feet for old growth and 4,000 feet for second growth. In old-growth stands, more than 50 percent of the volume is in trees above 15 inches in diameter; in second-growth stands, the greater volume is in trees 9 to 15 inches d.b.h.

2/ Cordwood stands contain upwards of 3 cords per acre in trees 5 to 9 inches in diameter. The regional average is about 9 cords.

3/ Fair to satisfactory restocking areas have from 40 to 100 percent of the ground occupied by commercial tree species.

4/ Poor restocking lands have 10 to 40 percent of the ground occupied. Areas with less than 10 percent stocking have been classified as deforested.

AREA OF FOREST LAND
BY CHARACTER OF TIMBER GROWTH

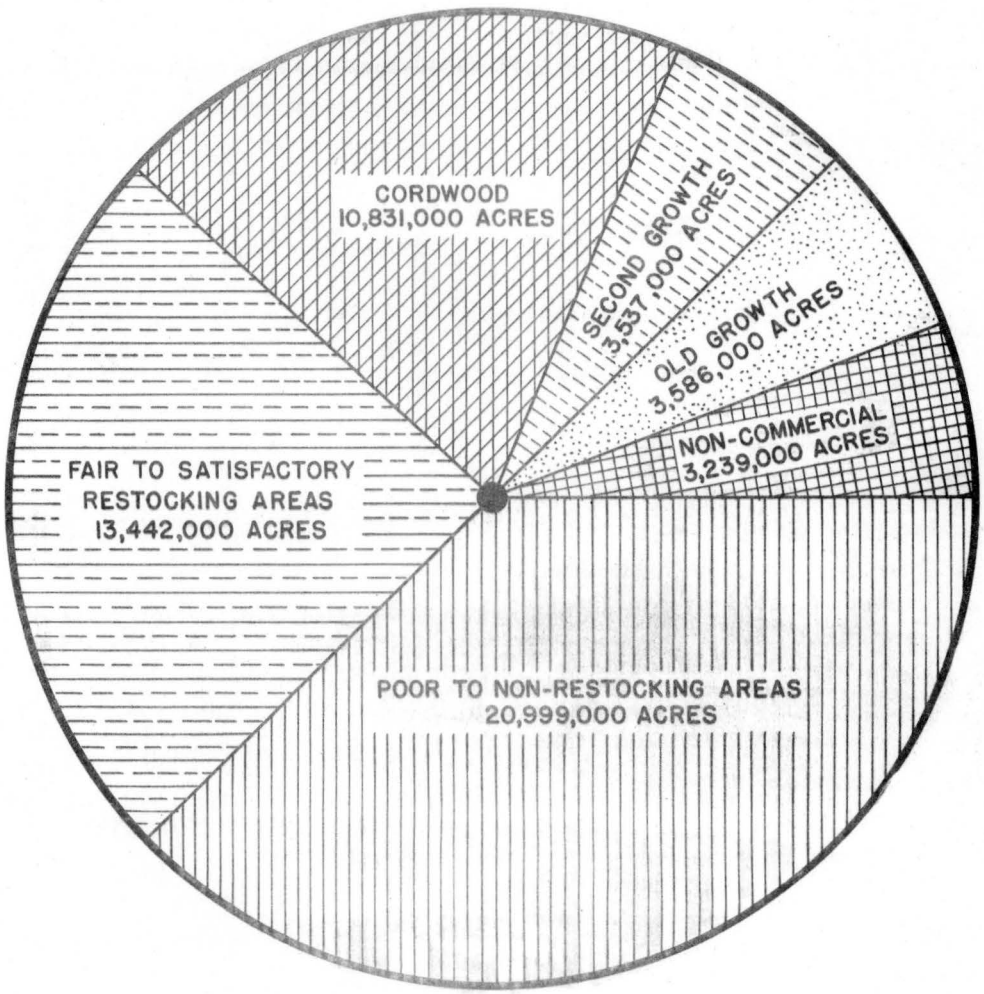


Table 4. -- Commercial forest land areas of the Lake States region by forest cover type and States

(Thousand acres)

State	All types	Pine	Northern hardwood	Oak	Lowland hardwood	Spruce fir	Conifer swamp	Aspen and scrub	Deforested
All areas									
Minnesota	17,244	1,670	894	476	616	1,088	2,567	7,418	2,515
Wisconsin	16,472	966	2,745	1,736	674	638	729	5,869	3,115
Michigan	18,679	1,029	4,576	1,307	683	1,421	1,364	5,088	3,211
Totals..	52,395	3,665	8,215	3,519	1,973	3,147	4,660	18,375	8,841
Saw-timber areas									
Minnesota	1,566	464	283	111	107	156	48	397	.....
Wisconsin	2,406	189	1,227	606	207	23	22	132	.....
Michigan	3,151	131	2,259	146	200	226	105	84	.....
Totals..	7,123	784	3,769	863	514	405	175	613	.....
Cordwood areas									
Minnesota	4,553	693	249	258	201	495	950	1,707	.....
Wisconsin	2,874	268	420	605	248	214	172	947	.....
Michigan	3,404	292	609	369	284	477	353	1,020	.....
Totals..	10,831	1,253	1,278	1,232	733	1,186	1,475	3,674	.....
Satisfactorily restocking areas									
Minnesota	4,777	247	137	39	104	196	958	3,096	.....
Wisconsin	4,498	251	674	291	85	186	360	2,651	.....
Michigan	4,167	198	1,041	253	61	408	570	1,636	.....
Totals..	13,442	696	1,852	583	250	790	1,888	7,383	.....
Poor or non-restocking areas									
Minnesota	6,348	266	225	68	204	241	611	2,218	2,515
Wisconsin	6,694	258	424	234	134	215	175	2,139	3,115
Michigan	7,957	408	667	539	138	310	336	2,348	3,211
Totals..	20,999	932	1,316	841	476	766	1,122	6,705	8,841

Table 5. -- Ownership of total commercial forest area[1/] in the Lake States Region, by States

(Thousand of acres)

State	Total acres commercial forests	Federal				State, county, municipal	Private		
		Total	National forest	Indian	Other		Total	Farm woodland	Industrial and other
All areas									
Michigan	18,679	2,319	2,011	6	302	2,413	13,947	3,816	10,131
Minnesota	17,244	2,833	2,234	429	170	8,244	6,167	4,732	1,435
Wisconsin	16,472	1,666	1,277	336	53	3,382	11,424	6,512	4,912
Total	52,395	6,818	5,522	771	525	14,039	31,538	15,060	16,478
Saw-timber areas									
Michigan	3,151	87	69	.....	18	147	2,917	553	2,364
Minnesota	1,566	536	489	42	5	402	628	413	215
Wisconsin	2,406	185	29	149	7	183	2,038	1,180	858
Total	7,123	808	587	191	30	732	5,583	2,146	3,437
Cordwood areas									
Michigan	3,404	223	161	2	60	478	2,703	679	2,024
Minnesota	4,553	695	430	235	30	1,755	2,103	1,228	875
Wisconsin	2,874	128	59	60	9	590	2,156	1,163	993
Total	10,831	1,046	650	297	99	2,823	6,962	3,070	3,892
Satisfactorily restocking areas									
Michigan	4,167	1,161	1,075	2	84	671	2,335	753	1,582
Minnesota	4,777	683	551	74	58	2,046	2,048	1,937	111
Wisconsin	4,498	709	624	70	15	1,071	2,718	1,448	1,270
Total	13,442	2,553	2,250	146	157	3,788	7,101	4,138	2,963
Poor or non-restocking areas									
Michigan	7,957	848	706	2	140	1,117	5,992	1,831	4,161
Minnesota	6,348	919	764	78	77	4,041	1,388	1,154	234
Wisconsin	6,694	644	565	57	22	1,538	4,512	2,721	1,791
Total	20,999	2,411	2,035	137	239	6,696	11,892	5,706	6,186

1/ The National Forest area includes government-owned land and areas which have been approved by the NFRC for purchase, as of June 30, 1938.

Indian holdings include tribal lands, trust allotments, ceded domain lands in certain reservations which have been recently revested in the tribes, lands purchased by the Indian Office for administration as tribal lands, and land acquired by the Resettlement Administration within reservations. Scattered tribal lands and allotments are also included.

"Other" federal holdings include remnant Public Domain (Minnesota only) and purchases by the Resettlement Administration, Park Service, Biological Survey, and War Department. Holdings of the Federal Land Banks are not included.

State, County, Municipal. -- Minnesota. Includes state trust fund (school and swamp grants), delinquent part-paid lands, purchased lands in state parks and forests, tax-forfeited lands (acreage delinquent on January 1, 1937 for 1930 or prior years). There are no county forest lands and a negligible acreage of municipal forest lands. State-owned farm woodlands (Rural Credit foreclosures) are not included as state land.

Wisconsin. Includes Congressional grants administered by the Land Commission, forestry lands acquired by the conservation department, tax forfeited lands (1932 and prior taxes) both inside and outside county forests, and tax-forfeited lands deeded to towns and school districts. Lands claimed both by the state and Indian Office are included with the state.

Michigan. Includes swamp, school, and other grant lands, part-paid grant lands, tax-forfeited lands forfeited prior to 1934. Long-term delinquent lands (4 million acres or more) which will forfeit to the state in 1939 are not included in state lands.

Farm woods have been computed from census and Forest Survey data.

Industrial and other includes what is left after deducting public and farmwoods areas.

CHANGES IN FOREST LAND OWNERSHIP IN THE LAKE STATES

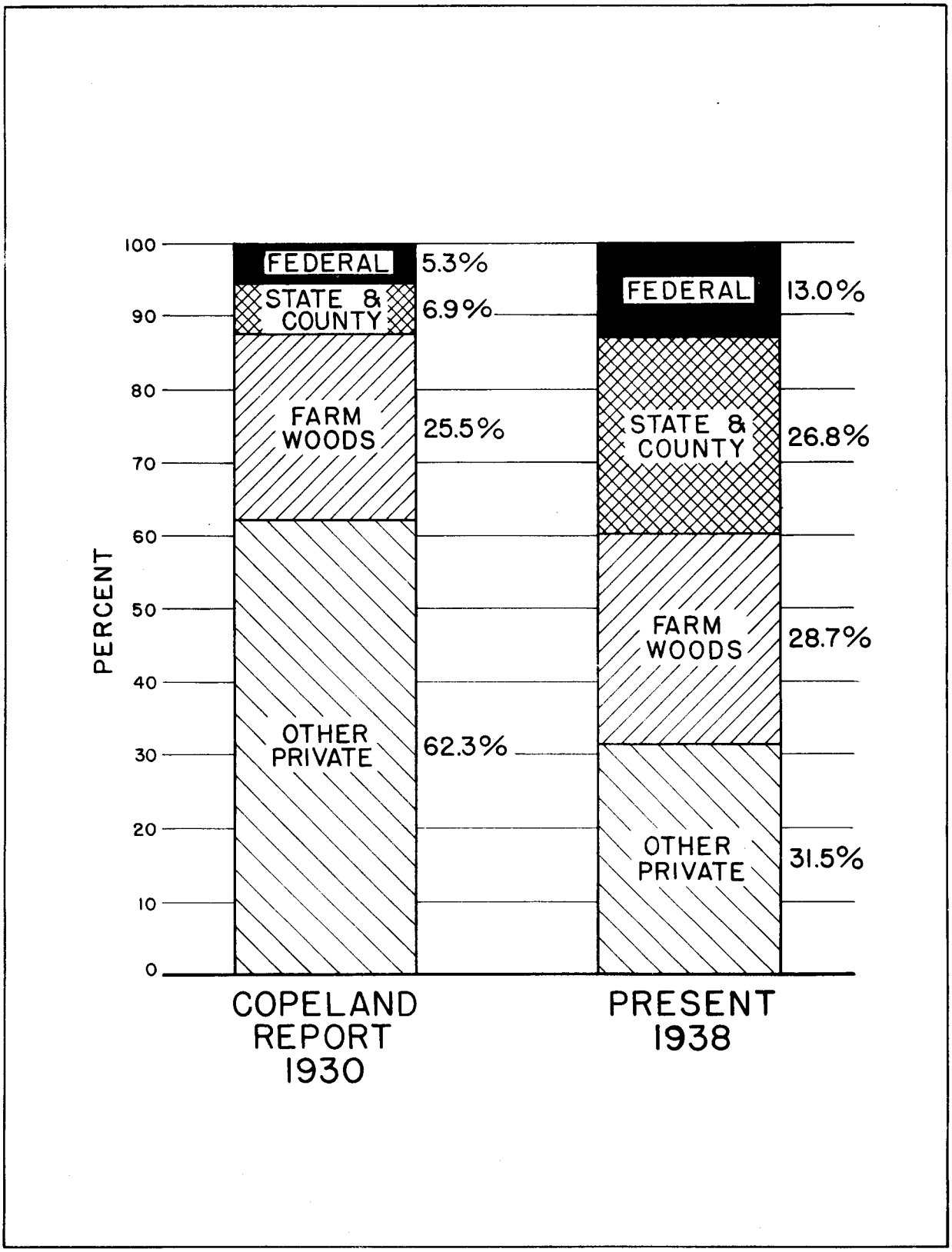


Table 6. -- Status of National Forests in the Lake States region as of June 30, 1938 1/

(Thousand acres)

State and forest	Gross area	Government owned	Desirable to acquire 2/		Non-purchasable
			State owned	Privately owned	
Minnesota					
Chippewa	1,313	562	253	321	177
Superior	3,729	1,823	423	1,405	78
Totals	5,042	2,385	676	1,726	255
Wisconsin					
Chequamegon	1,031	780	3	155	93
Nicolet	986	526	8	356	96
Totals	2,017	1,306	11	511	189
Michigan					
Ottawa	1,743	634	.....	761	348
Upper Michigan	1,327	762	60	306	199
Huron	810	366	25	339	80
Manistee	1,257	303	145	652	157
Totals	5,137	2,065	230	2,058	784
Regional totals	12,196	5,756	917	4,295	1,228

1/ Date from Regional Forester, Milwaukee, Wisconsin.

2/ Estimated cost

	Per acre	Total
Minnesota	$ 1.86	$ 4,463,626
Wisconsin	3.00	1,567,263
Michigan	6.69	15,285,700
	$ 4.09	$ 21,316,589

Table 7. -- Summary of timber volume[1] in the Lake States Region, by product and State

Product		Regional total	Minnesota	Wisconsin	Michigan
Saw timber [2]	M ft.b.m.	57,615,740	12,454,740	16,612,000	28,549,000
Cordwood [3]					
Small trees	Cords	122,286,000	47,767,000	32,195,000	42,324,000
Tops and limbs	Cords	70,394,000	15,209,000	22,834,000	32,351,000
Cull in sawlog trees	Cords	30,289,000	2,372,000	11,428,000	16,489,000
All cordwood	Cords	222,969,000	65,348,000	66,457,000	91,164,000
Cedar products					
Poles	Pieces	41,518,000	11,059,000	7,589,000	22,870,000
Round posts	Pieces	224,774,000	61,953,000	49,174,000	113,647,000
Split posts	Pieces	99,715,000	15,318,000	25,959,000	58,438,000
Other [4]	Cords	5,256,000	1,787,000	788,000	2,681,000
Cull trees	Cords	52,166,000	23,252,000	9,719,000	19,195,000
Equivalent Cubic Volume					
Saw timber	M cu.ft.	9,520,990	2,036,990	2,953,000	4,531,000
Small trees	M cu.ft.	8,804,200	3,439,200	2,318,000	3,047,000
Tops and limbs	M cu.ft.	4,223,490	912,490	1,370,000	1,941,000
Cull in sawlog trees	M cu.ft.	1,992,980	177,980	743,000	1,072,000
Cedar	M cu.ft.	1,267,750	336,750	240,000	691,000
Cull trees	M cu.ft.	3,494,830	1,557,830	651,000	1,286,000
All products	M cu.ft.	29,304,240	8,461,240	8,275,000	12,568,000

1/ Dead trees not included.

2/ International 1/4" kerf rule.

3/ Exclusive of cedar, and of cordwood cut from saw timber. Small trees include scrub trees of large diameter unsuitable for sawlogs.

4/ Includes small cedar trees containing no piece products, and tops above piece products.

Table 8. - Stand of saw timber on total commercial forest land area in Lake States region by character of growth and State

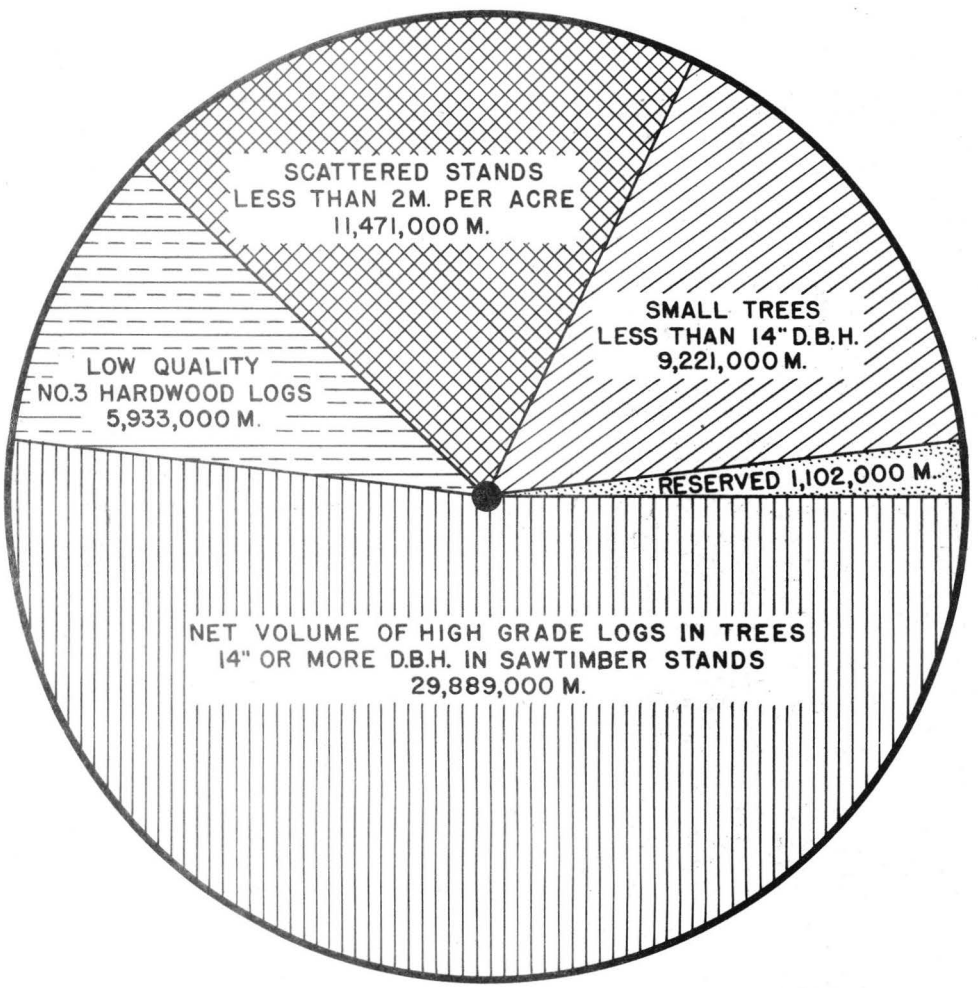
(Million feet, B.M., lumber tally)

State and character of volume	Total	Softwoods			Hardwoods		
		Total	Old growth	Second growth 1/	Total	Old growth	Second growth 1/
Minnesota.....	12,455	6,588	1,695	4,893	5,867	1,023	4,844
Wisconsin.....	16,612	4,709	3,019	1,690	11,903	6,005	5,898
Michigan.....	28,549	9,584	7,059	2,525	18,965	13,421	5,544
All States...	57,616	20,881	11,773	9,108	36,735	20,449	16,286

1/ Volume on land not classed as saw-timber area.

	Softwoods MM ft.b.m.	Hardwoods MM ft.b.m.
Minnesota.....	2,151	2,272
Wisconsin.....	783	2,671
Michigan.....	1,151	2,445
Totals.....	4,085	7,388

SAWTIMBER VOLUME IN THE LAKE STATES BY SIZE, QUALITY, AND AVAILABILITY



TOTAL 57,616,000M.

Table 9. -- Volume of saw timber in the Lake States Region, by species and State, by International rule, 1/4" kerf

Species	Regional total	Minnesota	Wisconsin	Michigan
	M feet, b.m.	M feet, b.m.	M feet, b.m.	M feet, b.m.
Softwoods				
White pine.....	3,753,200	1,598,200	1,145,000	1,010,000
Red pine.....	1,478,380	998,380	293,000	187,000
Jack pine.....	2,677,790	2,262,790	246,000	169,000
Spruce.....	2,362,730	1,240,730	138,000	984,000
Balsam-fir.....	1,089,310	350,310	133,000	606,000
Tamarack.....	297,340	137,340	82,000	78,000
Hemlock.....	9,222,000	.....	2,672,000	6,550,000
All softwoods..	20,880,750	6,587,750	4,709,000	9,584,000
Hardwoods				
Sugar maple.....	10,538,120	306,120	2,809,000	7,423,000
Yellow birch.....	5,252,230	93,230	1,388,000	3,771,000
Basswood.....	2,039,200	451,200	828,000	760,000
Elm.....	3,178,390	701,690	1,229,000	1,248,000
Beech.....	1,496,000	.....	170,000	1,326,000
Oak 1/.....	5,297,790	761,790	3,325,000	1,211,000
Aspen 2/.....	4,125,700	2,366,700	804,000	955,000
Paper birch.....	1,288,340	783,340	160,000	345,000
Soft maple.....	1,742,640	110,640	435,000	1,197,000
Miscellaneous hardwoods 3/....	1,776,280	292,280	755,000	729,000
All hardwoods..	36,734,990	5,866,990	11,903,000	18,965,000
All species.....	57,615,740	12,454,740	16,612,000	28,549,000

1/ Includes both red and white oak.
2/ Includes balsam poplar and cottonwood.
3/ Principally black ash, hickory, and hop-hornbeam.

SAWTIMBER VOLUME BY SPECIES AND CONDITIONS OF STAND

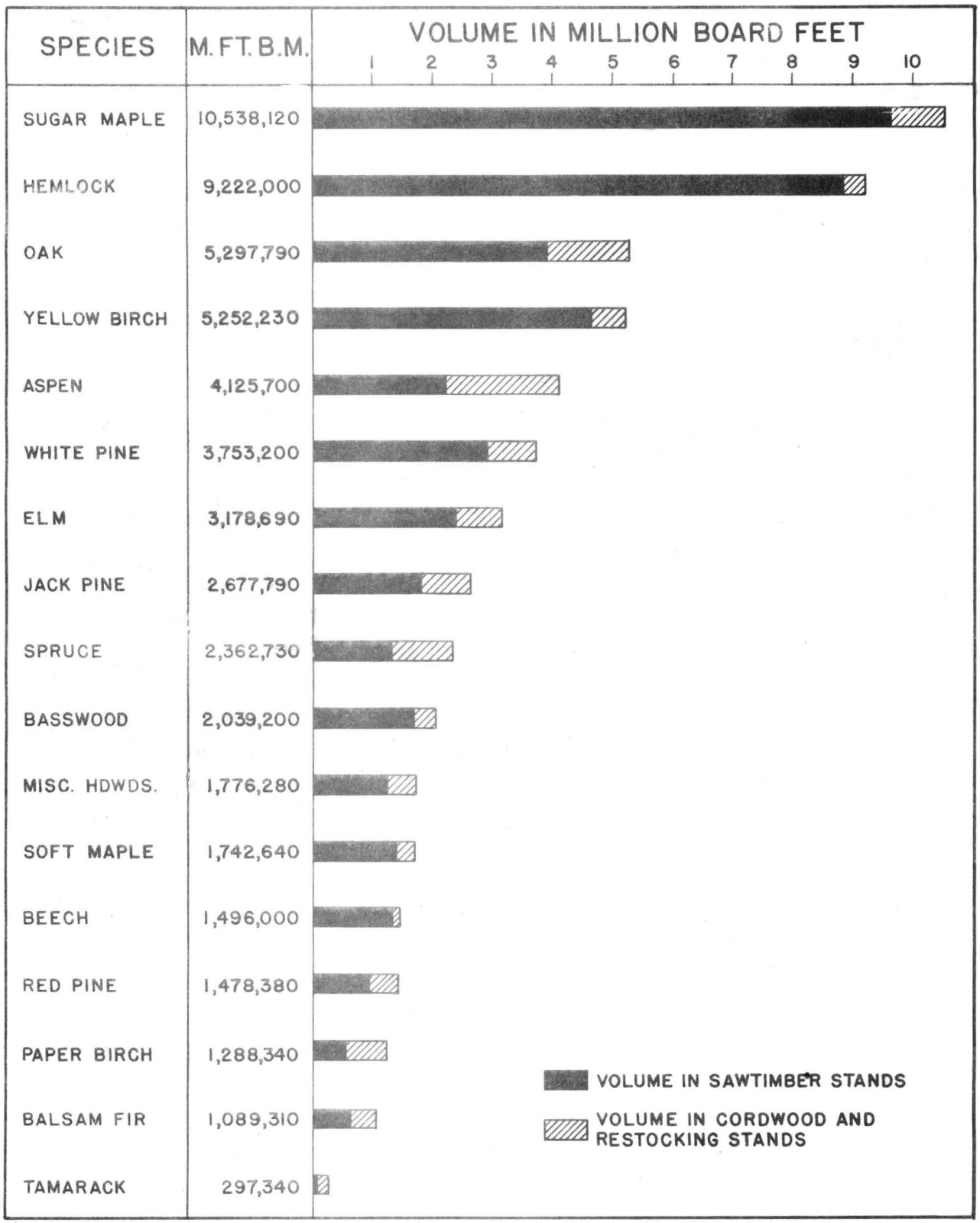


Table 10. -- Stand of cordwood on saw-timber, cordwood, and restocking areas of the Lake States region, by States

(Thousand cords)

State	Total	Saw-timber areas			Cordwood areas			Deforested and restocking areas		
		Total	Soft-wood	Hard-wood	Total	Soft-wood	Hard-wood	Total	Soft-wood	Hard-wood
Minnesota	65,348	19,840	7,361	12,479	36,437	15,563	20,874	9,071	3,251	5,820
Wisconsin	66,457	35,881	6,254	29,627	19,524	4,001	15,523	11,052	1,846	9,206
Michigan	91,164	55,962	15,370	40,592	24,081	6,919	17,162	11,121	2,537	8,584
All States	222,969	111,683	28,985	82,698	80,042	26,483	53,559	31,244	7,634	23,610

This cordwood volume includes tops (and limbs of hardwoods) of saw-timber trees to a minimum 4-inch diameter; culled sections of merchantable trees; and total volume of nonsawlog trees down to 5-inch diameter breast high. It does not include dead or cull trees. Figured on basis of customary piling practice in the region. The average cord contains 67 cubic feet of solid peeled wood.

Table 11. -- Total volume[1/] of pulping species in the Lake States Region

Species	Regional total	Minnesota	Wisconsin	Michigan
	Cords	Cords	Cords	Cords
Spruce.....	16,628,000	10,292,000	1,045,000	5,291,000
Balsam fir..	13,369,000	5,134,000	2,108,000	6,127,000
Jack pine...	17,960,000	13,565,000	2,406,000	1,989,000
Hemlock.....	33,774,000	.....	10,358,000	23,416,000
Tamarack....	3,079,000	1,639,000	648,000	792,000
Aspen.....	43,776,000	22,081,000	9,647,000	12,048,000
Total.....	128,586,000	52,711,000	26,212,000	49,663,000

1/ Total cubic volume of pulpwood species, including saw timber and some substandard pulpwood.

Table 12. -- Cedar volume in the Lake States Region, by product and State

Product		Regional total	Minnesota	Wisconsin	Michigan
Round posts	M pieces	224,774	61,953	49,174	113,647
Split posts	M pieces	99,715	15,318	25,959	58,438
Poles					
20 feet or less	M pieces	20,867	8,375	3,226	9,266
25 feet	M pieces	11,749	1,864	2,598	7,287
30 feet	M pieces	5,409	592	1,132	3,685
35 feet	M pieces	2,685	228	507	1,950
40 feet	M pieces	529	.....	77	452
45 feet	M pieces	279	.....	49	230
Total poles	M pieces	41,518	11,059	7,589	22,870
Unmerchantable wood	M cords	5,256	1,787	788	2,681
Total volume	M cu.ft.	1,267,750	336,750	240,000	691,000

Table 13. -- Total stand (cubic feet) in Lake States region, on total commercial forest land area by type of material and State

(Million cubic feet)

State	All material			Saw-timber trees			Cordwood trees		
	Total	Soft-wood	Hard-wood	Total	Soft-wood	Hard-wood	Total	Soft-wood	Hard-wood
Minnesota	6,903	3,251	3,652	3,127	1,519	1,608	3,776	1,732	2,044
Wisconsin	7,624	1,871	5,753	5,066	1,187	3,879	2,558	684	1,874
Michigan	11,282	3,848	7,434	7,544	2,495	5,049	3,738	1,353	2,385
All States	25,809	8,970	16,839	15,737	5,201	10,536	10,072	3,769	6,303

Table 14. -- Ownership of stand of saw timber on total commercial forest land area in Lake States region, by States

(Million feet, board measure)

State	Total timber volume M.B.F.	Federal					Private		
		Total	National forest	Indian	Other	State County Municipal	Total	Farm woodland	Industrial and other
Michigan..	28,549	866	718	17	131	1,046	26,637	4,107	22,530
Minnesota.	12,455	2,869	2,527	284	58	3,289	6,297	2,824	3,473
Wisconsin.	16,612	1,520	630	838	52	1,327	13,765	6,920	6,845
All States	57,616	5,255	3,875	1,139	241	5,662	46,699	13,851	32,848

Table 15. -- Volume of saw timber and cordwood on National Forest lands by State and Forest.

State and forest	Saw timber			Cordwood		
	Total	Softwood	Hardwood	Total	Softwood	Hardwood
	MM feet b.m.	MM feet b.m.	MM feet b.m.	M cords	M cords	M cords
Minnesota						
Chippewa.....	451	255	196	241	150	91
Superior.....	2,076	1,490	586	5,567	3,291	2,276
Total.....	2,527	1,745	782	5,808	3,441	2,367
Wisconsin						
Chequamegon.....	105	35	70	307	173	134
Nicolet.....	525	372	153	427	263	164
Total.....	630	407	223	734	436	298
Michigan						
Ottawa.....	592	257	335	271	159	112
Upper Michigan....	91	14	77	63	52	11
Huron.....	25	25	.....	312	172	140
Manistee.....	10	2	8	588	16	572
Total.....	718	298	420	1,234	399	835
Regional totals.....	3,875	2,450	1,425	7,776	4,276	3,500

Table 16. -- Current annual growth of timber in the Lake States

State	Combined saw-timber and cordwood growth			Saw-timber growth			Cordwood growth		
	Total	Soft-wood	Hard-wood	Total	Soft-wood	Hard-wood	Total	Soft-wood	Hard-wood
	Million cubic feet	Million cubic feet	Million cubic feet	Million feet b.m.	Million feet b.m.	Million feet b.m.	Thou-sand cords	Thou-sand cords	Thou-sand cords
Minnesota	373.1	137.1	236.0	551.2	271.9	279.3	3,949	1,347	2,602
Wisconsin	282.0	46.5	235.5	661.2	149.6	511.6	2,585	387	2,198
Michigan..	323.3	64.1	259.2	637.6	191.4	446.2	2,865	573	2,292
All States	978.4	247.7	730.7	1,850.0	612.9	1,237.1	9,399	2,307	7,092

Table 17. -- Forest products industries in the Lake States, by State and industry, 1929 and 1937 1/

State and industry	Year	Establishments	Salaried employees and wage earners	Salaries and wages	Value of products	Value added by manufacture
		Number	Average number	Thousand dollars	Thousand dollars	Thousand dollars
State						
Minnesota.....	1929	316	16,612	22,528	96,855	43,728
	1937	241	11,436	13,462	56,944	25,782
Wisconsin.....	1929	603	52,051	66,273	263,847	126,657
	1937	486	40,795	48,310	206,574	92,553
Michigan.....	1929	713	63,193	93,257	319,599	164,648
	1937	514	47,960	58,414	208,782	97,458
Totals.....	1929	1,632	131,856	182,058	680,301	335,033
	1937	1,241	100,191	120,186	472,300	215,793
Industry						
Lumber and timber products.....	1929	335	32,075	36,827	98,739	64,815
	1937	292	21,055	19,596	46,816	27,463
Pulp products.....	1929	47	5,316	7,317	51,452	19,041
	1937	43	5,138	6,849	45,539	17,002
Paper products.....	1929	98	25,560	39,312	212,328	84,517
	1937	101	27,696	39,783	209,476	82,443
Other forest products	1929	1,152	68,905	98,602	317,782	166,660
	1937	805	46,302	53,958	170,469	88,885
Totals.....	1929	1,632	131,856	182,058	680,301	335,033
	1937	1,241	100,191	120,186	472,300	215,793

1/ Basis: U. S. Census of Manufactures. For industries not reported separately by states, the figures were pro-rated on the basis of the number of inudstries in each state.

Table 18. -- Lumber production in the Lake States, by species and States, 1936 1/

(Thousand feet, board measure)

Species	Region	Minnesota	Wisconsin	Michigan
Softwoods				
Pine	124,163	77,316	27,578	19,269
Spruce	5,878	2,575	1,008	2,295
Balsam fir	3,238	1,194	1,712	332
Tamarack	2,574	1,194	875	505
Hemlock	238,238	120	153,897	84,221
Cedar	2,188	963	627	598
Total	376,279	83,362	185,697	107,220
Hardwoods				
Maple	268,512	1,294	79,445	187,773
Birch	122,478	2,191	62,502	57,785
Basswood	49,470	2,516	30,032	16,922
Elm	39,799	1,220	24,356	14,223
Beech	7,273	25	427	6,821
Oaks	25,956	3,602	15,004	7,350
Aspen	39,275	28,280	8,555	2,440
Miscellaneous hardwoods	8,498	512	3,452	4,534
Total	561,261	39,640	223,773	297,848
All species	937,540	123,002	409,470	405,068

1/ Source: U. S. Census of Manufactures. The Census only purports to cover mills cutting over 50 thousand board feet annually.

Table 18a. -- Lumber production in the Lake States, by species and States, 1937 1/

(Thousand feet, board measure)

Species	Region	Minnesota	Wisconsin	Michigan
Softwoods				
Pine	129,027	79,119	28,417	21,491
Spruce	6,494	2,940	841	2,713
Balsam fir	5,243	2,911	1,873	459
Tamarack	1,540	1,178	131	231
Hemlock	263,473	120	153,197	110,156
Cedar	2,862	873	1,413	576
Total	408,639	87,141	185,872	135,626
Hardwoods				
Maple	295,288	71	92,429	202,788
Birch	134,954	2,421	69,746	62,787
Basswood	44,427	2,148	23,880	18,399
Elm	34,216	1,638	18,324	14,254
Beech	11,827	.....	1,187	10,640
Oaks	29,257	2,696	15,667	10,894
Aspen	36,908	25,574	7,996	3,338
Miscellaneous hardwoods	9,853	688	4,061	5,104
Total	596,730	35,236	233,290	328,204
All species	1,005,369	122,377	419,162	463,830

1/ Source: U.S. Census of Manufactures. The Census only purports to cover mills cutting over 50 thousand board feet annually.

For 1938 the Division of Forest Economics of the U. S. Forest Service estimates the Lake States lumber production at 675 million board feet.

Table 19. -- Current average annual drain from the forests of the Lake States due to cutting, fire, and other agencies 1/

Agencies and products	Average annual woods production 2/				Equivalent annual depletion of standing timber 3/											
	Unit of measure	Quantity			Total tree volume 4/			Net sawlog volume 5/			Cordwood trees 6/			Cull and tops of saw timber trees 7/		
		Total	Softwoods	Hardwoods	Total	Softwoods	Hardwoods	Total	Softwoods	Hardwoods	Total	Softwoods	Hardwoods	Total	Softwoods	Hardwoods
		Thousands	Thousands	Thousands	Thousand cubic feet	Thousand cubic feet	Thousand cubic feet	Thousand feet BM	Thousand feet BM	Thousand feet BM	Cords	Cords	Cords	Cords	Cords	Cords
Lumber																
Lumber 8/	Board feet	1,144,223	451,134	693,089	308,003	110,234	197,769	1,168,359	452,797	715,380	5,222	208	5,014	1,874,419	552,581	1,321,838
Sawed ties	Pieces	4,024	627	3,397	40,280	5,476	34,804	132,691	17,188	115,503	.....	.....	.....	272,790	20,984	251,806
Sub-total	Board feet lumber tally	1,278,963	472,199	806,764	348,283	115,710	232,573	1,301,050	470,167	830,883	5,222	208	5,014	2,147,209	573,565	1,573,644
Hewed ties	Pieces	1,210	889	321	10,734	7,642	3,092	27,372	16,459	10,913	.....	.....	.....	43,823	20,968	22,855
Lath 9/	Pieces	59,095	47,815	11,280	118	44	74	319	128	191	292	97	195	581	129	452
Shingles 10/	Squares	164	162	2	2,332	2,286	46	965	790	175	153	111	42	1,274	1,016	258
Veneer																
Veneer 11/	Board feet (Scribner)	28,150	147	28,003	9,544	41	9,503	33,433	170	33,263	.....	.....	.....	65,855	177	65,678
Veneer boxes, baskets, and crates 12/	Board feet (Scribner)	23,640	689	22,951	7,012	192	6,820	25,719	710	25,009	1,847	181	1,666	44,597	726	43,871
Sub-total	Board feet (Scribner)	51,790	836	50,954	16,556	233	16,323	59,152	880	58,272	1,847	181	1,666	110,452	903	109,549
Cooperage	Board feet (Scribner)	5,332	.....	5,332	1,834	.....	1,834	6,186	.....	6,186	111	.....	111	13,694	.....	13,694
Logs and bolts in manufacture 13/	Board feet (Scribner)	40,882	4,617	36,265	12,209	781	11,428	44,885	1,624	43,261	486	.....	486	76,661	2,710	73,951
Distillation wood	Cords	310	.....	310	11,204	.....	11,204	36,687	.....	36,687	23,264	.....	23,264	62,097	.....	62,097
Pulpwood	Cords	1,366	1,274	92	121,901	113,906	7,995	249,561	235,392	14,169	824,667	764,486	60,181	314,032	294,483	19,549
Mine timbers																
Timbers	Cubic feet	9,334	8,551	783	11,346	9,946	1,400	46,739	41,356	5,383	.....	.....	.....	56,129	47,000	9,129
Poles and lagging	Cubic feet	3,628	3,460	168	4,038	3,770	268	3,952	2,992	960	20,264	19,986	278	4,984	3,371	1,613
Sub-total	Cubic feet	12,962	12,011	951	15,384	13,716	1,668	50,691	44,348	6,343	20,264	19,986	278	61,113	50,371	10,742
Piling	Pieces	52	40	12	1,648	1,220	428	7,370	5,915	1,455	.....	.....	.....	6,806	3,758	3,048
Poles	Pieces	480	480	.....	5,748	5,748	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Posts 14/	Pieces	40,861	12,124	28,737	41,380	13,508	27,872	51,136	119	51,017	206,875	19,945	186,930	99,839	113	99,726
Fuel wood 15/	Cords	8,078	1,298	6,780	214,099	9,719	204,380	226,211	5,720	220,491	2,073,750	111,833	1,961,917	428,000	7,403	420,597
Miscellaneous rough products 16/	Cubic feet	2,820	2,102	718	3,478	2,435	1,043	8,621	7,255	1,366	13,333	3,639	9,694	9,742	7,823	1,919
Excelsior 17/	Cords	76	.....	76	6,854	.....	6,854	14,992	.....	14,992	38,555	.....	38,555	21,161	.....	21,161
Exported logs	Board feet															
Exported logs	(Scribner)	2,935	.....	2,935	884	.....	884	3,309	.....	3,309	.....	.....	.....	5,887	.....	5,887
Exported pulpwood	Cords	11	11	.....	1,026	1,010	16	1,413	1,393	20	9,153	9,000	153	2,032	2,016	16
Sub-total	.....	.....	.....	.....	1,910	1,010	900	4,722	1,393	3,329	9,153	9,000	153	7,919	2,016	5,903
Total industrial drain	.....	.....	.....	.....	815,672	287,958	527,714	2,089,920	790,190	1,299,730	3,217,972	929,486	2,288,486	3,404,403	965,258	2,439,145
Other agencies																
Fire	.....	.....	.....	.....	67,360	20,130	47,230	88,515	29,849	58,666	576,625	146,361	430,264	139,484	36,322	103,162
Other losses	.....	.....	.....	.....	98,280	37,686	60,594	169,212	62,432	106,780	664,556	238,889	425,667	284,000	83,355	200,645
Total	.....	.....	.....	.....	165,640	57,816	107,824	257,727	92,281	165,446	1,241,181	385,250	855,931	423,484	119,677	303,807
Total drain all agencies	.....	.....	.....	.....	981,312	345,774	635,538	2,347,647	882,471	1,465,176	4,459,153	1,314,736	3,144,417	3,827,887	1,084,935	2,742,952

*Too small to appear in thousands.

1/ As there is very little timber in the Lake States absolutely reserved from cutting of any kind, no distinction has been made between commercial and noncommercial forests. The figures in this table represent the average annual drain or average annual rate of depletion on all the standing timber of the Lake States caused by logging, fires, and other agencies.

2/ "Average Annual Woods Production" is an estimate of the volume of forest products cut in the Lake States from wood obtained in the same state where processed in an average year during the decade 1935 to 1944. This estimate is based on production during the past few years and on indications of future trends. Industrial statistics for 1936 indicate that that year was close to normal in volume of forest products cut and processed. Mill production from imported timber is excluded but production from logging waste, mill waste, deadheads, dead trees and all other material obtained in each respective Lake State is included. All products are in the original or common unit of measure, that is, in the unit of measure and form in which the material was reported. Thus, about half of the pulpwood was reported piled with the bark on, the rest was piled peeled. All the excelsior was piled peeled.

3/ The rate of timber depletion or forest drain is based on woods production shown in the preceding columns, and on the rate of fire damage and other losses but the products have been charged to the various elements of the stand from which they were cut, sawlogs, cordwood trees, etc. Where there is waste in cutting or utilization of material not considered merchantable, allowance has been made for that. And all products have been converted to standard units of measure.

4/ This represents the drain on all merchantable trees over 5 inches in diameter breast high, and all tops and limbs down to 4 inches in diameter inside bark. Cubic feet refer to the cubic volume of wood excluding bark. Drain on cedar is shown only in this column.

5/ This is the volume of merchantable sawlogs after cull has been scaled out, expressed in the International (1/4") log rule. Cedar not included.

6/ Cordwood trees are all those smaller than saw-timber size down to 5 inches diameter breast high. Cedar not included. The cordwood is expressed in standard 128 cubic-foot cords, the material being piled with the bark on. The cubic contents of wood only is 72 cubic feet per cord. Piled peeled this material would run about 86 cubic feet per cord. To convert from rough to peeled basis multiply by 0.837.

7/ These columns include the tops and limbs and cull contained in merchantable saw-timber trees, expressed in terms of rough cords. Cedar not included. Some of this material is utilized for pulpwood, fuel wood, and other products, but much of it is left in the woods or slabbed out at the mill. However, all this material goes together with the saw-timber volume and the volume of cordwood trees to make the total cubic-foot volume. Cords of this material average 62 cubic feet of solid wood per cord piled rough. Piled peeled they would average about 77 cubic feet per cord. To convert from rough to peeled basis multiply by 0.805.

8/ Includes all box and crate lumber produced except that shown below as used in the manufacture of veneer boxes and crates.

9/ Includes snow-fence pickets, berry-bush stakes, and small hardwood squares cut in lath mills. Box lumber cut in lath mills is not included. Lath production figures for Upper Michigan are based on U.S. Census of Manufacture reports during the past few years.

10/ Includes shakes and mine wedges.

11/ Veneer and plywood not manufactured into a finished product in the same establishment.

12/ This item is chiefly veneer manufactured into boxes, baskets, and crates, in the same establishment where cut, but it also includes some lumber cut and used for cheese-box heading, crating, etc.

13/ Includes coat hangers, paper plugs, a small amount of egg crates, shrunken wood, turned ornamental posts and pillars, heels, shoe lasts, toothpicks, bowling pines, brush backs, handles, spoons, bowls, matches, clothespins, souvenirs, etc.

14/ Includes farm fence posts, commercial posts, snow-fence posts, grape-vine posts, fish-net stakes, and sign-board posts up to 14 feet. Sign-board and other posts greater than 14 feet in length are considered to be poles.

15/ Includes wood used at brick and lime kilns; in Wisconsin and Michigan includes all mill waste whether used for fueling steam engines, plant heat, or distributed as fuel wood.

16/ Includes rough products such as bridge timbers, cribbing, railings, and ornamental material used on public forests, cabin poles, and car stakes.

17/ Excelsior bolts are usually reported in 55-inch cords. These volumes have been converted to standard cords.

Table 20. -- Present volume, annual growth, allowable drain, and actual drain of saw timber, by states and subdivisions

State and subdivision	Present volume	Current annual growth	Allowable annual drain 1/	Present annual drain
	M ft.b.m.	M ft.b.m.	M ft.b.m.	M ft.b.m.
Minnesota				
North 2/	10,349,000	477,100	389,000	379,300
South 3/	2,106,000	94,200	48,000	87,000
Total	12,455,000	571,300	437,000	466,300
Wisconsin				
North 4/	9,272,000	265,400	195,900	611,000
South 5/	7,340,000	332,800	185,100	227,300
Total	16,612,000	598,200	381,000	838,300
Michigan				
Upper Peninsula 6/	23,283,000	343,500	588,900	758,400
North Half, Lower Peninsula 7/	2,320,000	148,700	41,800	93,400
South Half, Lower Peninsula 8/	2,946,000	88,100	81,300	191,200
Total	28,549,000	580,300	712,000	1,043,000
Regional total	57,616,000	1,749,800	1,530,000	2,347,600

1/ After making provision for building up the growing stock over a period of 20 to 40 years.

2/ Forest-survey units 1, 2, 3, and 4 - Minnesota.

3/ Forest-survey units 5 and 6 - Minnesota.

4/ Forest-survey units 1 and 2 - Wisconsin.

5/ Forest-survey units 3 and 4 - Wisconsin.

6/ Forest-survey units 1 and 2 - Michigan.

7/ Forest-survey unit 3 - Michigan.

8/ Forest-survey unit 4 - Michigan.

COMPARISON OF CURRENT ANNUAL DRAIN, GROWTH, AND ALLOWABLE CUT OF SAWTIMBER IN THE LAKE STATES